

Concrete Work Made Easy

TABLES

Giving the Quantities of
Materials Required in
Concrete Construction

IMPORTANT

This booklet contains valuable tables of figures which are constantly useful. Do not throw it away, but keep it handy for ready reference.

THE SANDUSKY CEMENT CO.
Cleveland, Ohio

BRIEF POINTS

To be Observed *Carefully* in Concrete Construction

1. Use the proper proportions for the work intended.
2. If applying concrete or cement plaster to a base which is in the least porous, such as Tile, Brick, Sand, old Concrete Walls, Floors, etc., the base must be thoroughly soaked with water before applying. Otherwise the water will be drawn out of the fresh concrete before it has had a chance to set properly and the results will be a failure.
3. Remember that after the concrete has set for a day or until it is sufficiently hardened to permit removal of the forms, it should be kept thoroughly wetted with a hose, or better still, kept covered with a wet cloth for a week or ten days. The wetter the concrete is kept during the curing process, and the longer it is kept so, the harder, denser, tougher and more perfect it will be.
4. Best results are obtained by making the mixture of a soft plastic consistency, so as to flow readily into the forms with slight spading. Do not, however, use a sloppy mixture, particularly if great strength or impermeability to water is desired.

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5. Hydrated lime will be found of value in stucco or cement plaster in making the mass work more easily under the trowel. Though not water-repellent, it aids in such work. As it is an inert substance a moderate quantity only should be used, not over 10% of the weight of cement.

6. Troweling should be kept to a *minimum* and the fresh concrete should not be touched for more than a few seconds after placing, or crazing is likely to result.

7. To guard against crazing: Keep wet while curing. Use a 10% solution of calcium chloride dissolved in water instead of the plain water. (Cheap and easily obtainable from all druggists and chemical supply dealers). Trowel as little as possible. Keep covered with a wet cloth.

8. After placing always ram or tamp all concrete mixtures thoroughly with the edges of a spade to drive out air bubbles and compact the mass. This will effect a noticeable saving in materials and a pronounced improvement in the concrete. It will also prevent unsightly pockets, air bubbles, etc.

Note:—As packed by the manufacturer, 1 barrel or 4 sacks of portland cement weighs 380 lbs. 1 sack of cement weighs 95 lbs. When slightly compacted by jarring, 1 cubic foot of cement will weigh 95 lbs.

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WHY USE WATERPROOFING?

Ordinary Concrete Not Waterproof

Ordinary concrete employed in construction work, while possessing more valuable qualities than any other material of equal cost, is not impervious to water.

The Cause

Concrete contains on an average of 20% to 30% of voids or empty spaces and readily absorbs a considerable quantity of water which may be passed through the mass by the force of capillary attraction. This is the chief reason why basements are damp, why second story concrete floors often leak, why light colored stucco looks dark and ugly for some time after a rain, why tunnels have water dripping from their roofs and down their walls and why cisterns and reservoirs do not hold water.

The Remedy

To overcome this difficulty it is necessary to apply either a waterproof paint or coating or else to decrease the porosity and size of pores sufficiently to prevent the passage of the smallest particles of water.

The oil paints, coatings and membranes now on the market are seldom sufficiently permanent to justify their cost. They are not, moreover, proof against more than a moderate water pressure and eventually peel, crack or separate from the concrete surface.

Medusa Waterproofing, however, is a material that is incorporated integrally in the concrete, being mixed with the cement itself. It is impossible for it to wash out because it is sealed within the mass.

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Only complete disintegration of the concrete could displace it. It is water-repellent and is as permanent as the concrete itself.

MEDUSA WATERPROOFING

1. Will positively render concrete damp-proof and waterproof.
2. Will prevent rusting of iron reinforcing.
3. Will, by keeping out water, prevent freezing of such water in the pores and the resulting gradual disintegration of the concrete.

Medusa Waterproofing was invented by S. B. Newberry, President of the Sandusky Cement Company and a pioneer in the cement industry, in order to supply the need for a material which, at small cost, would effectually make concrete watertight. It is the original integral waterproofing and has proved its worth in a large number of important pieces of construction.

Amount Necessary, Etc.

For Basement Walls, Cisterns, Stucco, Interior Plaster, etc., add Medusa Waterproofing to the amount of 2% of the weight of the cement used, (about 8 lbs. to the barrel of cement). Where large masses of concrete are employed 1½% will be sufficient. In stucco or cement plaster, hydrated lime may be added to give additional plasticity in amount up to 10% by weight of the cement used.

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If Medusa Waterproofing Powder is used, it should be mixed with the cement. If the Paste is preferred, this should be stirred in with the gauging water. Waterproofed concrete should be more thoroughly mixed than the ordinary concrete since it takes somewhat longer to bring the water into intimate contact with the cement.

Cost of Waterproofing

The cost of Medusa Waterproofing is approximately that of competitive material. The Sandusky Cement Company will, upon receipt of the necessary information for any specific kind of work, be pleased to advise the correct amount of waterproofing required and its cost.

GENERAL INFORMATION

The following figures are based on broken stone containing 45% voids with the dust screened out and are applicable to average concrete construction.

Variation in the fineness of sand and the compacting of the concrete may affect the quantities by 10% in either direction.

By rammed concrete is meant concrete which, after placing, has been thoroughly tamped or rammed with the edge of a spade to drive out the air, compact the mass and give greater density. This is advised for all concrete work.

To make concrete, cement plaster or cement mortar waterproof, use Medusa Waterproofing to the amount of 2% by weight of the quantity of cement used (about 8 lbs. to the barrel of cement).

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TABLE OF RECOMMENDED MIXTURES

In this table the figures are for the volumes of the cement, sand, and pebbles or broken stone used. For example: A 1:2:3 mixture means 1 sack (1 cubic foot) of Portland cement, 2 cubic feet of sand, and 3 cubic feet of gravel or broken stone.

A 1:2 mixture means 1 sack (1 cubic foot) of Portland cement and 2 cubic feet of sand.

1:1:1 —The wearing course of two-course floors subject to heavy trucking, such as occurs in factories, warehouses, on loading platforms, etc.

1:1:1½ —The wearing course of two-course pavements in which case the gravel or crushed stone is graded from $\frac{1}{4}$ to $\frac{1}{2}$ inch.

1:2:3 —Reinforced concrete roof slabs.

One course concrete road, street, and alley pavements.

One-course walks and barnyard pavements.

One-course concrete floors.

Fence posts.

Sills and lintels without mortar surface.

Watering troughs and tanks.

Reinforced concrete columns.

Construction subjected to water pressure, such as reservoirs, swimming pools, storage tanks, cisterns, elevator pits, vats, etc.

1:2:4 —Reinforced concrete walls, floors, beams, columns and other concrete members designed in combination with steel reinforcing.

Concrete for the arch ring of arch bridges and culverts; foundations for large engines causing heavy loading, some impact and vibration.

Concrete work in general subject to vibration.

Reinforced concrete sewer pipe.

1:2½:4 —Silo walls, grain bins, coal bins, elevators and similar structures.

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1:2½:4—Building walls above foundations, when stucco finish will not be applied.

Walls of pits or basements, subject to considerable exposure to moisture, but practically no direct water pressure.

Manure pits, dipping vats, hog wallows.

Backing of concrete block.

Base of two-course road, street and alley pavements.

1:2½:5—Walls above ground which are to have stucco finish.

Base of two-course sidewalks, feeding floors, barnyard pavements and two-course plain concrete floors. Abutments and wing walls of bridges and culverts, dams, small retaining walls.

Basement walls and foundations for ordinary conditions where water-tightness is not essential.

Foundations for small engines.

1:3:6 —Mass concrete such as large gravity retaining walls, heavy foundations and footings.

1:1½ —Inside plastering of water tanks, silos and bin walls, when required, and for facing walls below ground when necessary to afford additional protection against the entrance of moisture.

Black plastering of gravity retaining walls.

1:2 —Scratch coat of exterior plaster (cement and stucco). Facing block and similar concrete products. Wearing course of two-course walks, floors, subjected only to light loads, barnyard pavements, etc.

1:2½ —Intermediate and finish stucco coats.

Fence posts when coarse aggregate is not used.

1:3 —Concrete block when coarse aggregate is not used. Concrete brick. Concrete drain tile and pipe when coarse aggregate is not used.

Ornamental concrete products.

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CONCRETE FLOORS

Quantities of materials required for
100 sq. ft. 1:2:4 (rammed concrete)

Inches thick....	2½	3	3½	4	4½	5
Cement, bbls....	1.17	1.40	1.63	1.87	2.10	2.33
Sand, cu. ft.....	9.38	11.25	13.13	15.01	16.88	18.76
Stone, cu. ft.....	18.76	22.50	26.26	30.02	33.76	37.52
Medusa Water- proofing, lbs...	9	11	13	15	17	18½

100 sq. ft. 1:2½:5 (rammed concrete)

Inches thick....	2½	3	3½	4	4½	5
Cement, bbls....	.96	1.15	1.34	1.53	1.72	1.91
Sand, cu. ft.....	9.58	9.78	9.97	10.16	10.35	10.55
Stone, cu. ft.....	19.16	19.56	19.94	20.32	20.70	21.10
Medusa Water- proofing, lbs...	7½	9	10½	12	13½	15

AREA OF CEMENT MORTAR

One barrel of Portland cement will cover, when mixed in proportions shown, approximately as follows:

Cement	Sand	Thickness Mortar Inches	Square Feet	Pounds Medusa Water'f'g
1	2	¼	480	8
1	2	½	240	8
1	2	¾	160	8
1	2	1	120	8
1	2½	¼	580	8
1	2½	½	290	8
1	2½	¾	195	8
1	2½	1	145	8
1	3	¼	680	8
1	3	½	340	8
1	3	¾	230	8
1	3	1	170	8

(Add 40 lbs. hydrated lime to 1 barrel of cement)

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A CUBIC YARD OF RAMMED CONCRETE

Requires approximately the following quantities of cement, sand, gravel, or broken stone. Use Medusa Waterproofing to the amount of 2% by weight of the cement. Do not use leaner mixtures than 1:2 sand or 1:2:4 where waterproof concrete is required.

Proportions	Cement			Sand			Gravel or Stone	
	bbls.	cu.yds.	cu.ft.	cu.yd.	cu.ft.	cu.yd.	cu.ft.	
1:1:2	2.63	.39	10.52	.39	10.52	.78	21.04	
1:1½:3	1.91	.28	7.64	.42	11.34	.85	22.95	
1:2:4	1.51	.22	6.04	.45	12.15	.89	24.03	
1:2½:5	1.24	.18	4.96	.46	12.42	.92	24.84	
1:3:6	1.06	.16	4.24	.47	12.69	.94	25.38	
1:4:8	.18	.12	3.24	.48	12.96	.96	25.92	

VOLUME OF RAMMED CONCRETE

Obtained from 1 barrel of 4 cubic feet of cement. (Eight pounds of Medusa Waterproofing are required for a barrel of cement or any of the following mixtures):

Proportions	Cement		Sand		Gravel or Stone		Concrete	
	cu.yd	cu.ft	cu.yd.	cu.ft.	cu.yd.	cu.ft.	cu.yd.	cu.ft.
1:1:2	.15	4	.15	4	.30	8	.38	10.3
1:1½:3	.15	4	.22	6	.44	12	.52	14.1
1:2:4	.15	4	.30	8	.59	16	.66	17.9
1:2½:5	.15	4	.37	10	.74	20	.81	21.8
1:3:6	.15	4	.44	12	.89	24	.95	25.6
1:4:8	.15	4	.59	16	1.19	32	1.23	33.2

CEMENT PLASTER OR CEMENT MORTAR

(With very fine sand)

Do not use leaner mixes than 1:2 sand where waterproof plaster or mortar is required.

Quantities of materials required per 100 sq. ft., based on cement weighing 95 lbs. to cu. ft.

Proportions	1 Cement	1 Sand	1 Cement	1½ Sand
Inches thick	1½	1½	½	2
Packed Cement, bbls. . . . .	.69	1.38	.56	1.11
Loose Sand, cu. ft.	5.50	8.25	3.34	6.67
Medusa Waterproofing, lbs.	2.75	11	4½	9
	5½	16½		13½

Proportions	1 Cement	2 Sand	1 Cement	2½ Sand
Inches thick	½	1	½	1
Packed Cement, bbls. . . . .	.47	.93	.40	.80
Loose Sand, cu. ft.	7.50	11.26	15.00	1.24
Medusa Waterproofing, lbs.	3.75	11	15	12.01
	4	7½	3	9½

Proportions	1 Cement	3 Sand	1 Cement	2½ Sand
Inches thick	½	1	½	1
Packed Cement, bbls. . . . .	.35	.70	.06	.67
Loose Sand, cu. ft.	8.42	12.63	1.41	2.22
Medusa Waterproofing, lbs.	4.21	5½	8½	13.34
	3		11	18

Medusa Waterproofing is used in proportion of 2% of weight of cement—equal to 2 lbs. Waterproofing to a sack, or 8 lbs. to the barrel of cement.

THE SANDUSKY CEMENT CO.

CEMENT PLASTER OR CEMENT MORTAR

(With Ordinary Coarse Bank Sand)

Do not use leaner mixes than 1:2 sand where waterproof plaster or mortar is required.

Quantities of materials required per 100 sq. ft., based on cement weighing 95 lbs. to the cu. ft.

Proportions.....	1 Cement	1 Sand	2	1 Cement	1½ Sand	2½ Sand
Inches thick.....	1½	1	1½	½	1	1½
Packed Cement, bbls.....	.75	1.51	2.26	.60	1.20	2.39
Loose Sand, cu. ft.....	3.00	6.00	9.01	3.59	7.17	10.76
Medusa Waterproofing, lbs.	6	12	18	5	10	14
Proportions.....	1 Cement	2 Sand	2	1 Cement	1½ Sand	2½ Sand
Inches thick.....	½	1	1½	½	1	1½
Packed Cement, bbls.....	.50	.99	1.49	.42	.85	2
Loose Sand, cu. ft.....	3.96	7.92	11.88	4.21	8.42	1.69
Medusa Waterproofing, lbs.	4	8	12	3½	7	12.63
Proportions.....	1 Cement	3 Sand	2	1 Cement	1½ Sand	2½ Sand
Inches thick.....	½	1	1½	½	1	1½
Packed Cement, bbls.....	.37	.74	1.11	.48	1.27	1.69
Loose Sand, cu. ft.....	4.42	8.84	13.26	17.68	12	16.84
Medusa Waterproofing, lbs.	3	6	9			13½

Medusa Waterproofing is used in proportion of 2% of weight of cement—equal to 2 lbs. Waterproofing to a sack, or 8 lbs. to the barrel of cement.

CONCRETE WORK MADE EASY

Volume of Plastic Mortar Made from Different Proportions of Cement and Sand
 Quantities of Materials Per Cubic Yard
 (Reprinted from Taylor & Thompson's "Concrete, Plain and Reinforced," page 230)

Relative proportions by volume*	Volume of Compacted Plastic Mortar						Materials for 1 cu. yd. Compact Plastic Mortar Based on Barrel of					
	From 1 cu. ft. Cement			From 1 bbl. Cement			3.5 cu. ft.			3.8 cu. ft. ¶		
	Based on Portland Cement weighing		Based on barrel of									
Cement	Sand	108 lbs. per cu. ft.	100 lbs. per cu. ft.	95 lbs. per cu. ft.	90 lbs. per cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	bbl.	cu. yd.
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. yd.	cu. yd.
1	0	0.93	0.86	0.80	0.72	3.2	3.2	3.2	3.2	8.31	8.31	8.31
1	$\frac{1}{2}$	1.12	1.06	1.02	0.92	4.0	4.1	4.1	4.1	6.92	0.46	0.47
1	1	1.48	1.42	1.38	1.28	5.2	5.4	5.5	5.5	5.22	0.68	0.71
1	$\frac{1}{2}$	1.84	1.78	1.74	1.74	6.4	6.7	7.0	7.0	4.20	0.81	0.84
1	2	2.20	2.14	2.11	2.11	7.7	8.1	8.4	8.4	3.51	0.91	0.93
1	$\frac{2}{3}$	2.56	2.50	2.47	2.47	9.0	9.5	9.9	9.9	3.01	0.98	1.00
1	3	2.92	2.86	2.83	2.83	10.2	10.9	11.3	11.3	2.64	1.03	1.05
1	$\frac{3}{2}$	3.28	3.23	3.19	3.19	11.5	12.2	12.8	12.8	2.35	1.06	1.08
1	4	3.64	3.59	3.55	3.55	13.6	13.6	14.2	14.2	2.12	1.10	1.11

Note—Variations in the fineness of the sand and the cement, and in consistency of the mortar may affect the values by 10% in either direction.

*Cement as packed by manufacturers, sand loose.

One cubic yard cement plaster covers:

$\frac{5}{8}$ " thick—45 sq. yds. $1\frac{1}{4}$ " thick— $31\frac{1}{2}$ sq. yds. $1\frac{3}{4}$ " thick— $22\frac{1}{2}$ sq. yds.

$\frac{3}{4}$ " thick—54 sq. yds. $1\frac{1}{2}$ " thick—36 sq. yds. $2"$ thick—27 sq. yds.

10% lime added will increase these quantities not more than 5%.

¶Use these columns ordinarily.

OUR COMPLETE LINE

Medusa Gray Portland Cement

Medusa White Portland Cement

Medusa Waterproofing Powder

Medusa Waterproofing Paste

Medusa Waterproofed Gray Cement

Medusa Waterproofed White Cement

THE SANDUSKY CEMENT CO.
Cleveland, Ohio

Mills at: York, Pa.; Bay Bridge (Sandusky) Ohio; Dixon, Ill.

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